Morrison

DINOSAURS!

•DISCOVER THE GIANTS OF STORIC WORLD•

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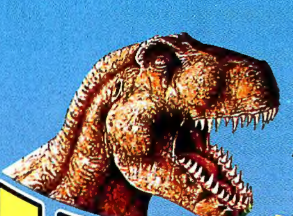

DINOSAURS!

• DISCOVER THE GIANTS OF THE PREHISTORIC WORLD •

IDENTIKIT

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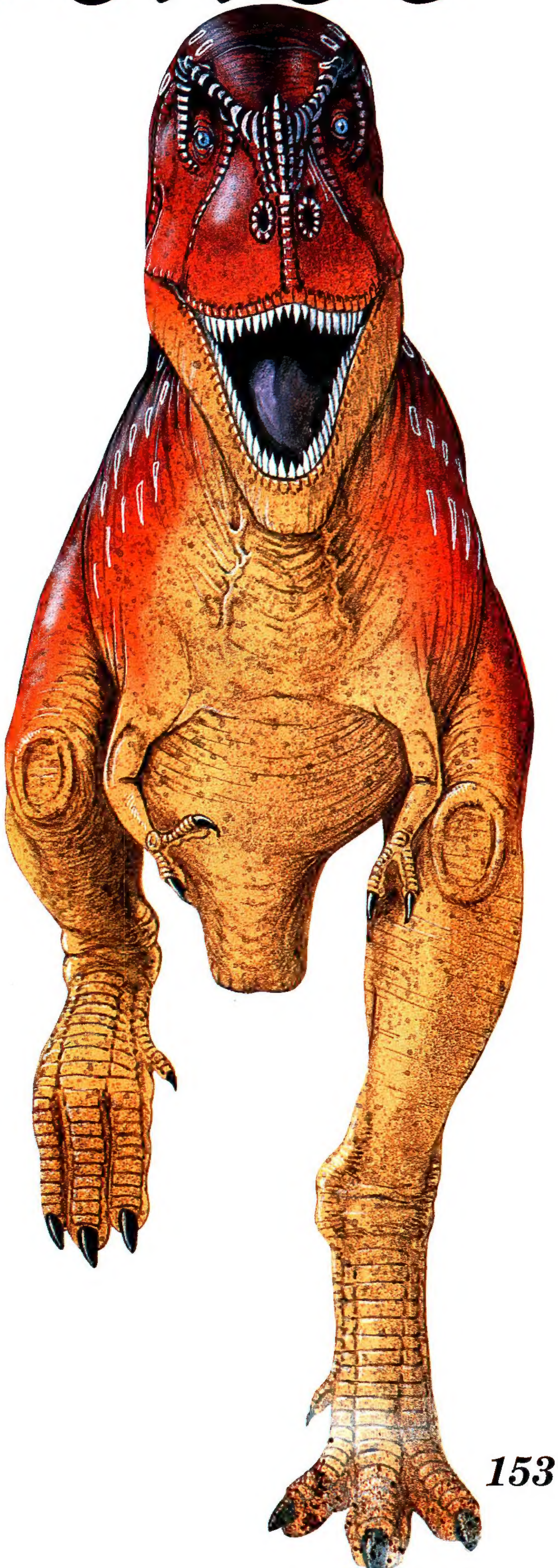
INDOSUCHUS

Indosuchus was a huge, fierce meat-eating dinosaur built very much like the great _Tyrannosaurus rex._

Experts were excited when dinosaur fossils were discovered in India. *Dravidosaurus*, one of the last stegosaurs, and the sauropod, *Barapasaurus*, were among early finds in the last century.



FLESH-EATER

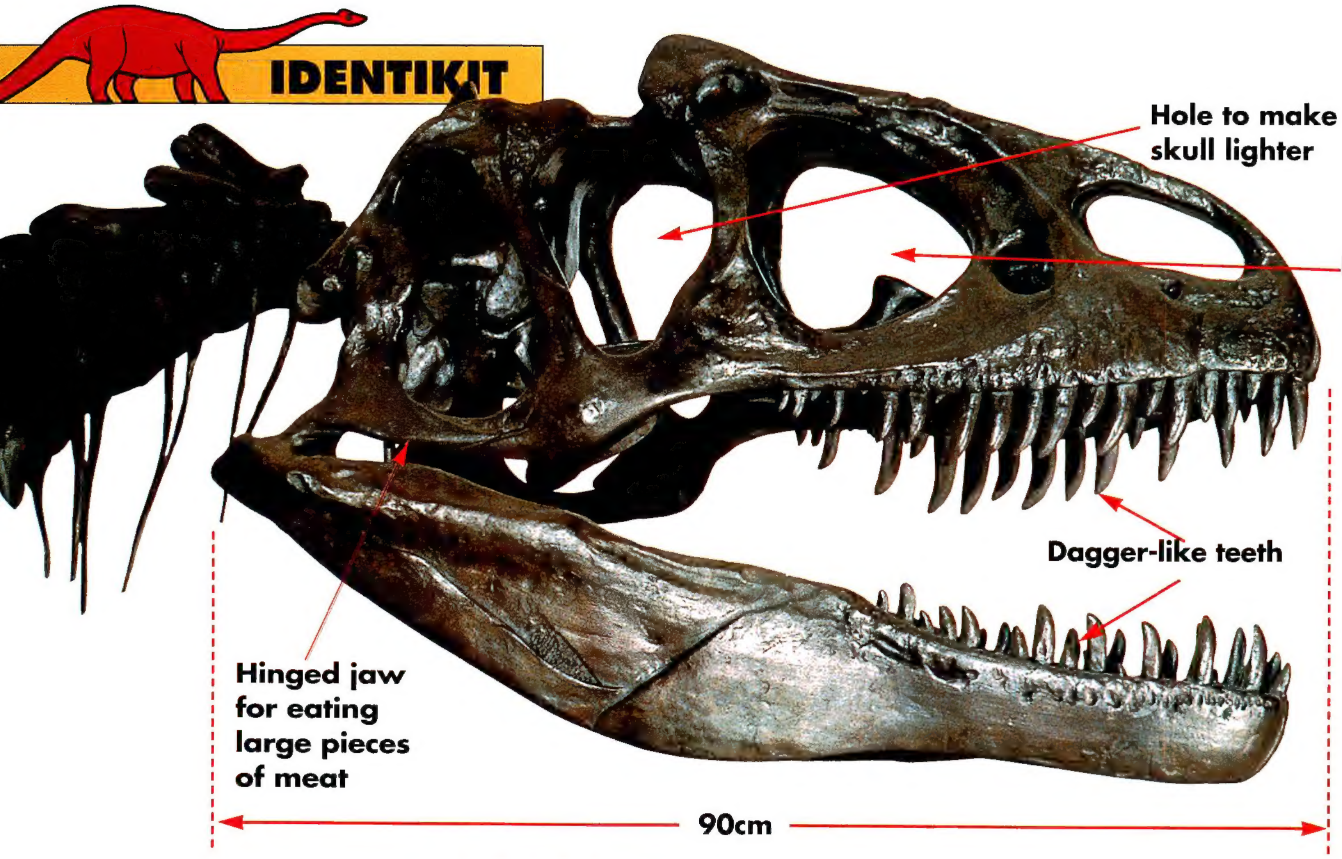
Indosuchus was named in 1933. Only a fragment of its skull and some teeth were found. However, these were enough to show palaeontologists that *Indosuchus* was a flesh-eater.

ANCHORS AND MEAT HOOKS

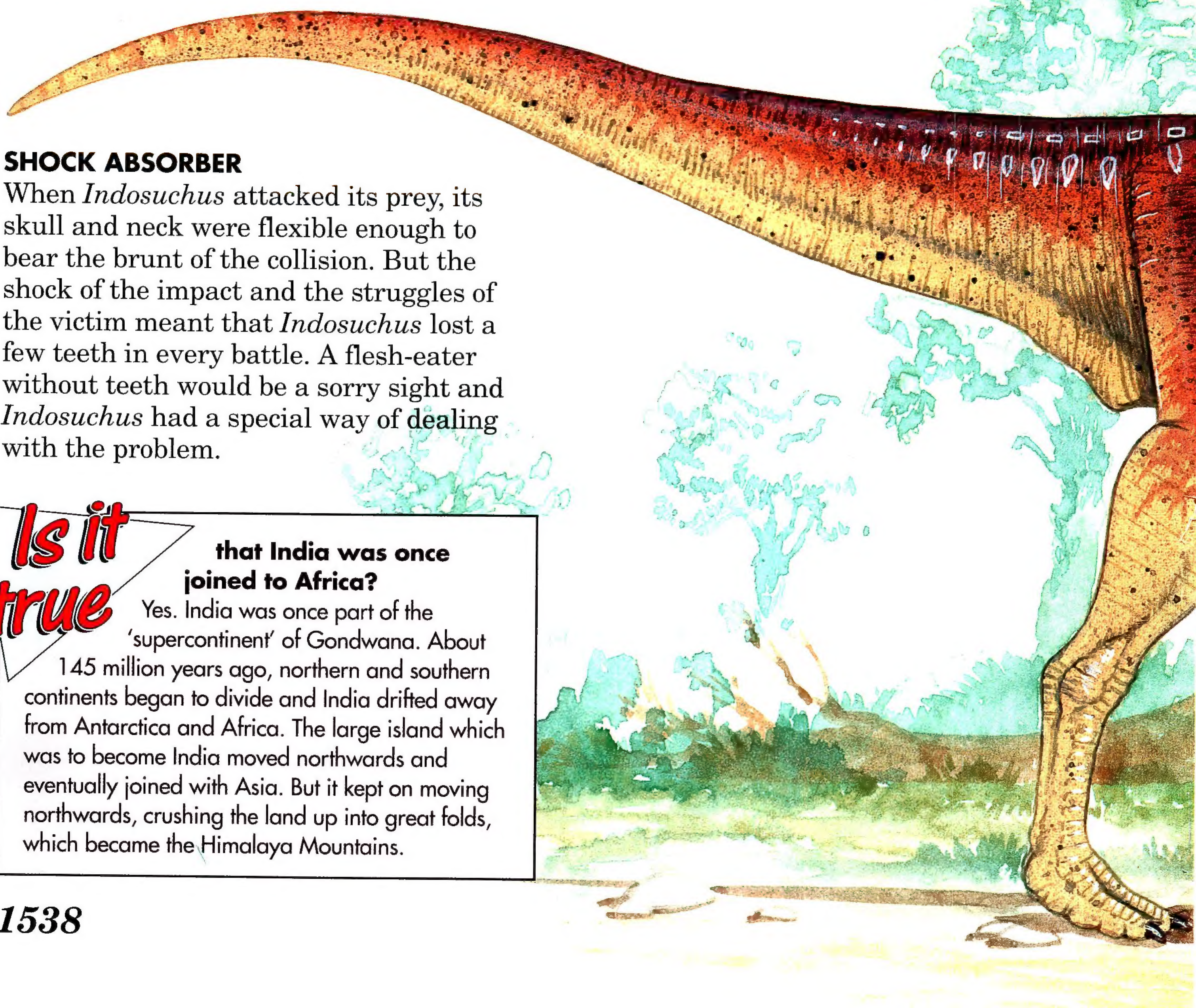
As long as today's elephant, *Indosuchus* walked on two powerful legs. Like *Tyrannosaurus rex*, its arms were tiny compared with the rest of its body. As it thundered along, *Indosuchus* held its arms and hands close against its body. Experts think that the hands were used to grip the ground when the tyrannosaurid heaved itself up from a resting position or as meat hooks to hold down prey.

WALKING TALL

Indosuchus walked upright with its back level and its body balanced by a tail held stiffly behind. It had a large head, but 'windows' or openings in the skull made the head light enough to be moved from side to side as *Indosuchus* scanned the landscape for its next meal.


Hole to make skull lighter
Eye socket
Dagger-like teeth
Hinged jaw for eating large pieces of meat
90cm

Only fragments of *Indosuchus'* skull have been found but experts think it would be a smaller version of the *Allosaurus* skull shown here.



SHOCK ABSORBER

When *Indosuchus* attacked its prey, its skull and neck were flexible enough to bear the brunt of the collision. But the shock of the impact and the struggles of the victim meant that *Indosuchus* lost a few teeth in every battle. A flesh-eater without teeth would be a sorry sight and *Indosuchus* had a special way of dealing with the problem.

Is it true that India was once joined to Africa?

Yes. India was once part of the 'supercontinent' of Gondwana. About 145 million years ago, northern and southern continents began to divide and India drifted away from Antarctica and Africa. The large island which was to become India moved northwards and eventually joined with Asia. But it kept on moving northwards, crushing the land up into great folds, which became the Himalaya Mountains.

NEW TEETH FOR OLD

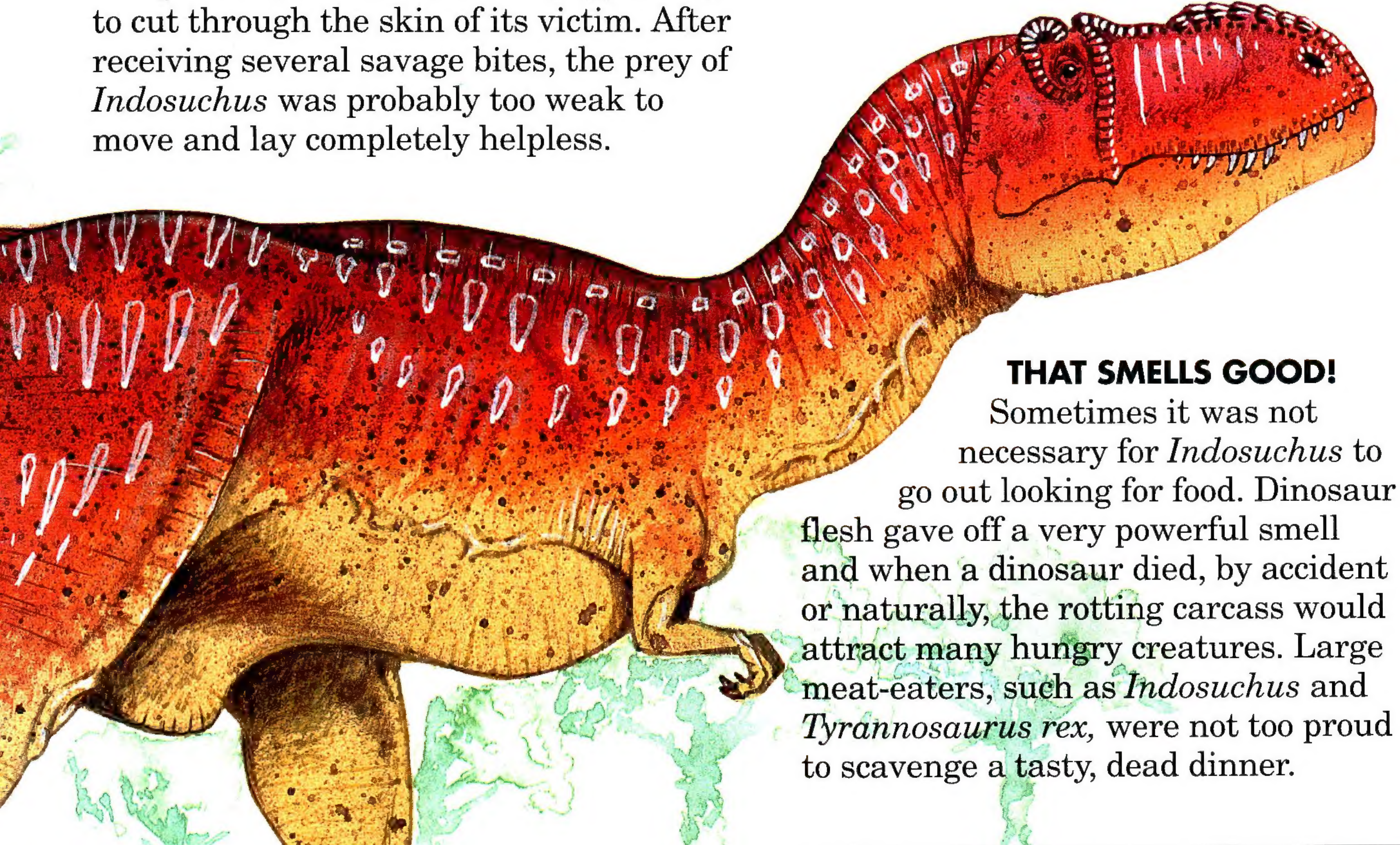
We have to look after our teeth. If our second, or permanent, teeth are damaged, they have to be repaired or replaced with false teeth. *Indosuchus* had no such problem. When scientists took an X-ray of the dinosaur's skull fragments, they saw that small teeth were tucked out of sight, deep in the jaw. When a tooth fell out, a new tooth came to the surface to replace it.

MONSTER FACTS

- **NAME:** *Indosuchus* (in-doh-soo-kus) means 'Indian crocodile'
  GROUP: dinosaur
- **SIZE:** up to 6m long
- **FOOD:** meat
- **LIVED:** about 75 million years ago in the Late Cretaceous Period in central India

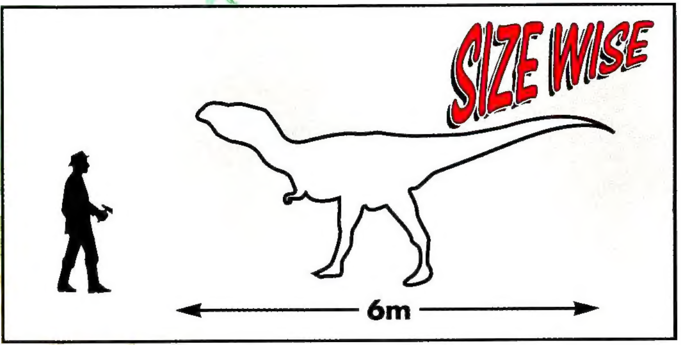
BITING FIT

Some of *Indosuchus*' teeth were as long as the middle finger of a human hand. Sharp and pointed, each tooth had a jagged edge to cut through the skin of its victim. After receiving several savage bites, the prey of *Indosuchus* was probably too weak to move and lay completely helpless.



THAT SMELLS GOOD!

Sometimes it was not necessary for *Indosuchus* to go out looking for food. Dinosaur flesh gave off a very powerful smell and when a dinosaur died, by accident or naturally, the rotting carcass would attract many hungry creatures. Large meat-eaters, such as *Indosuchus* and *Tyrannosaurus rex,* were not too proud to scavenge a tasty, dead dinner.



DEINOGALERIX

***Deinogalerix* was a hairy, hunting hedgehog.**

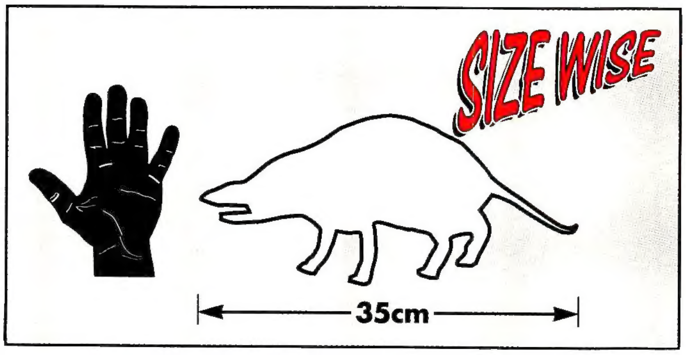
This extraordinary meat-eating mammal lived during the Miocene Epoch about 10 million years ago. It lived on an island which is now joined to the land mass we call Italy.

AMBITIOUS HUNTER

On its island home, *Deinogalerix* did not have to compete for food with many other hunters. It was able to hunt bigger prey than today's hedgehogs, catching small lizards and mammals rather than insects and worms.

NOSE TWITCHER

When out searching for prey, *Deinogalerix* scuttled along in the undergrowth on four short legs with its whiskery nose twitching. Its jaw was filled with sharp teeth and it used its pointed front teeth to bite its victims, spearing an arm or leg and leaving them helpless.

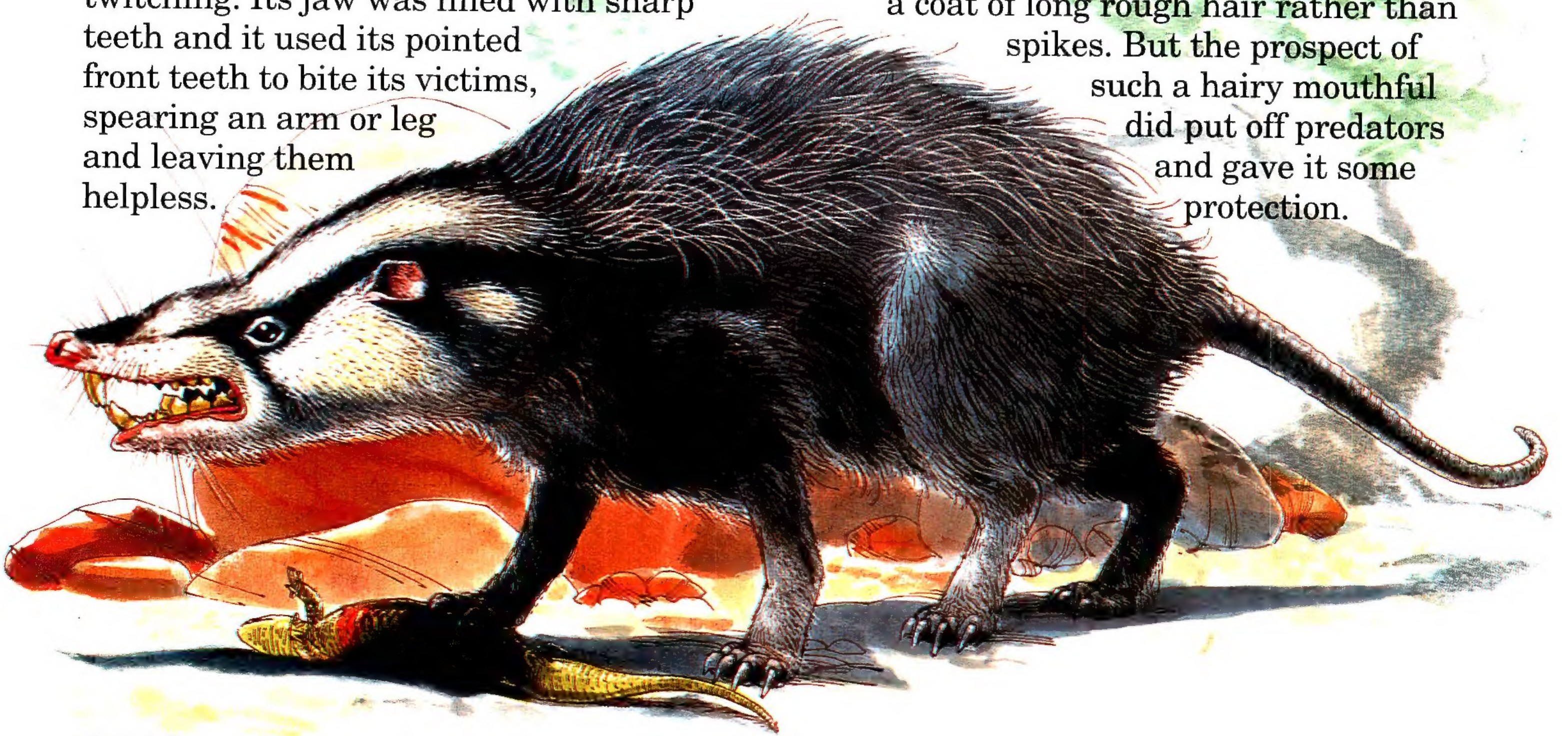


MONSTER FACTS

- **NAME:** *Deinogalerix* (dine-oh-gal-er-ix) means 'terrible hedgehog'
- **GROUP:** mammal
- **SIZE:** about 35cm long
- **FOOD:** small lizards and mammals
- **LIVED:** about 10 million years ago in the Miocene Epoch in southern Italy

HAIRY HEDGEHOG

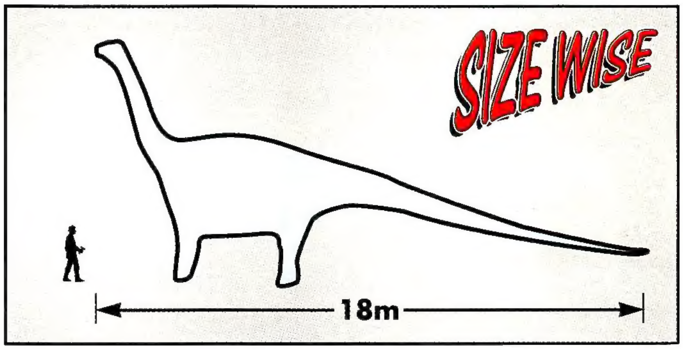
Unlike today's hedgehog, *Deinogalerix* had a coat of long rough hair rather than spikes. But the prospect of such a hairy mouthful did put off predators and gave it some protection.



ANTARCTOSAURUS

***Antarctosaurus* was as long as two buses parked end to end.**

This huge sauropod is known from only a few fossils, but experts think that it was probably related to *Diplodocus*. Ten times heavier than a modern elephant, *Antarctosaurus* was about three times taller than a man. In comparison with the rest of its body, this gigantic plant-eater had a tiny head.

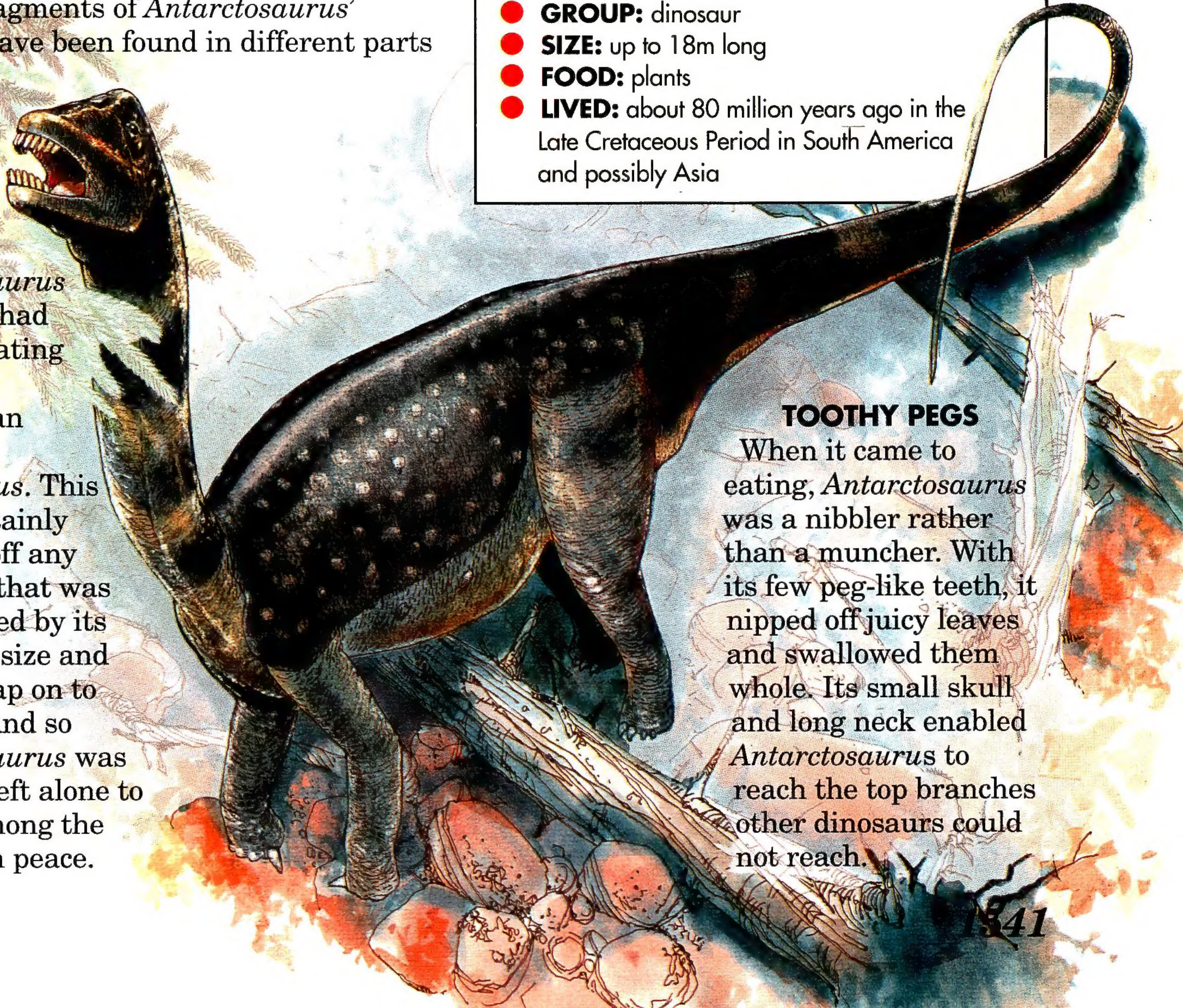


MONSTER FACTS

- **NAME:** *Antarctosaurus* (ant-ark-toe-saw-rus) means 'southern reptile'
- **GROUP:** dinosaur
- **SIZE:** up to 18m long
- **FOOD:** plants
- **LIVED:** about 80 million years ago in the Late Cretaceous Period in South America and possibly Asia

ARMOURED BACK

Several fragments of *Antarctosaurus*' skeleton have been found in different parts of South America. Some experts think that *Antarctosaurus* may have had armour plating like the Argentinian sauropod *Saltasaurus*. This would certainly have put off any carnivore that was not deterred by its enormous size and tried to leap on to its back. And so *Antarctosaurus* was probably left alone to browse among the treetops in peace.



TOOTHY PEGS

When it came to eating, *Antarctosaurus* was a nibbler rather than a muncher. With its few peg-like teeth, it nipped off juicy leaves and swallowed them whole. Its small skull and long neck enabled *Antarctosaurus* to reach the top branches other dinosaurs could not reach.

Devonian world

Fishes ruled the seas during the Devonian Period, but insects were the miniature monsters that ruled the dry parts of the world.

The Devonian World lasted from 408 to 362 million years ago. The oceans were ruled by huge predatory fish. Animals and plants began to flourish on dry land.

THE CHANGING WORLD

If you could travel back in time to Devonian Earth, you would find a very different world to ours. There were only two main land masses. One was Laurasia, which was made up of North America, Europe and most of Asia. The other land mass was Gondwana, which was made up of South America, Africa, Australia, India and Antarctica.

SUPERCONTINENT

Much of Laurasia and some of Gondwana was covered by shallow seas. During this Period the two great land masses moved together to form one supercontinent called Pangaea.

THE AGE OF FISHES

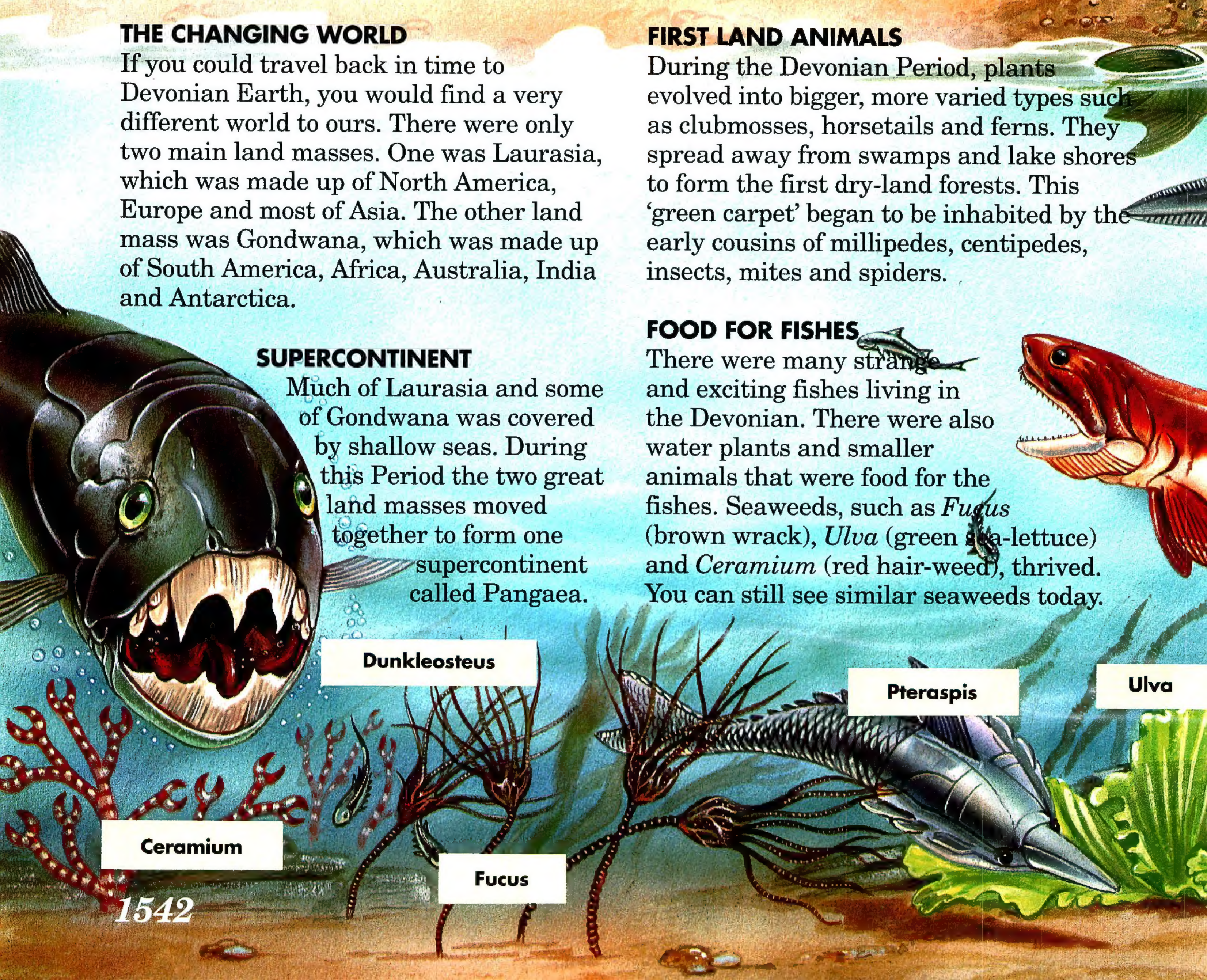
Fossils show that Devonian waters swarmed with life. There were seaweeds and coral reefs. Worms and trilobites burrowed in the mud at the bottom of the lakes and oceans. Above them swam the shellfishes. The early jawless fishes were joined by fishes with spines, with bony plates of armour, or with fleshy-based fins which they used to haul themselves out of the water.

FIRST LAND ANIMALS

During the Devonian Period, plants evolved into bigger, more varied types such as clubmosses, horsetails and ferns. They spread away from swamps and lake shores to form the first dry-land forests. This 'green carpet' began to be inhabited by the early cousins of millipedes, centipedes, insects, mites and spiders.

FOOD FOR FISHES

There were many strange and exciting fishes living in the Devonian. There were also water plants and smaller animals that were food for the fishes. Seaweeds, such as *Fucus* (brown wrack), *Ulva* (green sea-lettuce) and *Ceramium* (red hair-weed), thrived. You can still see similar seaweeds today.

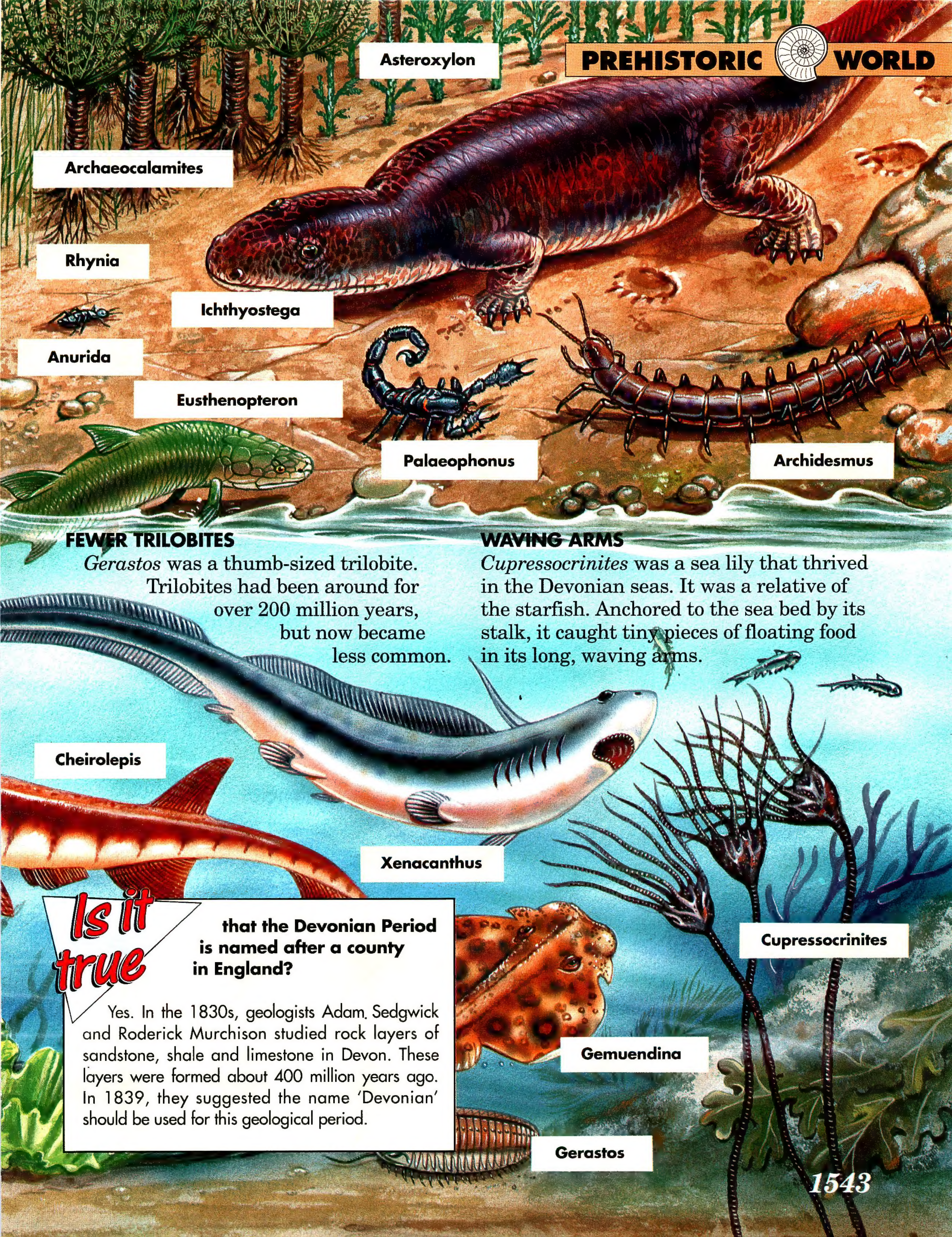

Dunkleosteus

Pteraspis

Ulva

Ceramium

Fucus



FEWER TRILOBITES

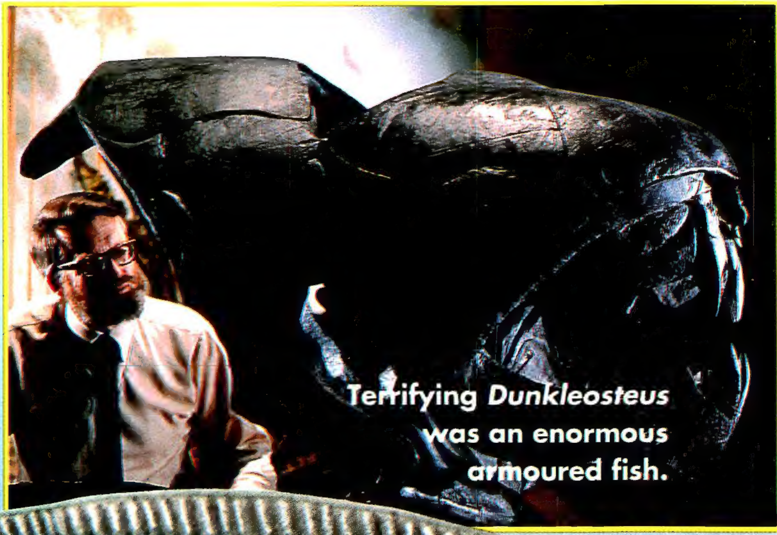
Gerastos was a thumb-sized trilobite. Trilobites had been around for over 200 million years, but now became less common.

WAVING ARMS

Cupressocrinites was a sea lily that thrived in the Devonian seas. It was a relative of the starfish. Anchored to the sea bed by its stalk, it caught tiny pieces of floating food in its long, waving arms.

Is it true that the Devonian Period is named after a county in England?

Yes. In the 1830s, geologists Adam. Sedgwick and Roderick Murchison studied rock layers of sandstone, shale and limestone in Devon. These layers were formed about 400 million years ago. In 1839, they suggested the name 'Devonian' should be used for this geological period.



Terrifying *Dunkleosteus* was an enormous armoured fish.

NO JAWS

Jawless fishes, such as *Pteraspis*, were still around in the Devonian Period. *Pteraspis* was an amazing-looking fish, with a head shield and spines on its back. Its mouth was underneath a long snout. Experts think it was a powerful swimmer.

GREAT JAWS

The terror of Devonian seas was the giant *Dunkleosteus*. It had massive jaws and at 9m long was bigger than today's Great White Shark. It was a placoderm, meaning 'plated skin', and had bony plates of armour on its head and on the front of its body. Another placoderm was *Gemuendina*, which had a flattened body like that of a ray. *Gemuendina* was as long as a human foot. The Devonian Period also saw the appearance of sharks, such as *Cladoselache* and *Xenacanthus*. The sharks have hardly changed since then.

IT'S A FACT

THAT THERE WAS A DEVONIAN SWORDFISH

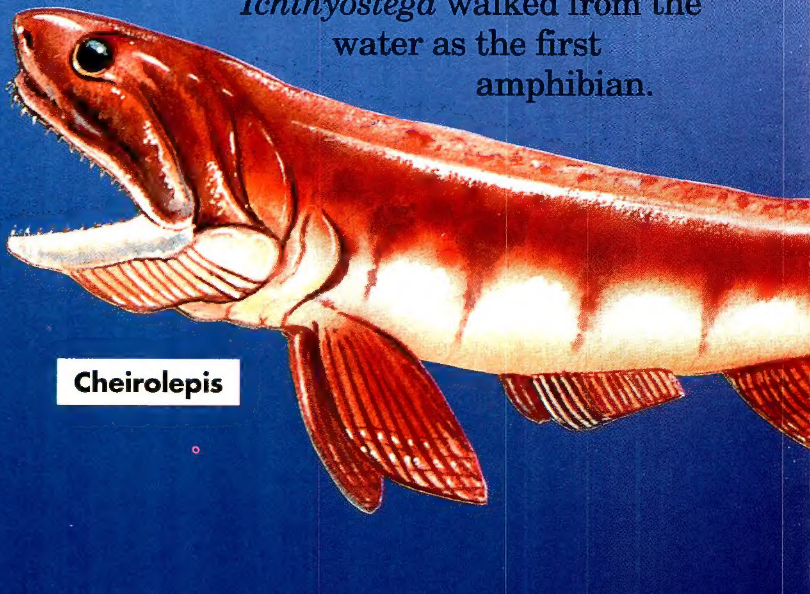
The swordfish design, of a long, flat snout with spikes along either side, appears many times during the evolution of the fishes. Even the jawless fishes of Devonian times had their 'swordfish'. It was called *Doryaspis* and was as big as a human hand. Strangely, its mouth was above its sword-snout, and it had saw-teeth on its bony 'side-wings' too!

STEPS ON TO LAND

Ray-fins, common fishes today, first appeared in Devonian times. There was the wide-mouthed, sharp-toothed, 50cm-long hunter *Cheirolepis* and the fish-finger-sized *Moythomasia*. There were also lobe-fins such as *Eusthenopteron*. These had lungs for breathing air and could probably drag themselves on to the land using their fins.

FOUR LEGS FOR WALKING

It was only a short step from lobe-finned fishes to four-legged land animals. The lobe-fins evolved legs and feet, and *Ichthyostega* walked from the water as the first amphibian.



Cheirolepis

SPREADING ACROSS THE LAND

Ichthyostega did not walk on to an empty landscape. New kinds of land plants were evolving. These were 'vascular' plants, which means they had a system for circulating liquids through their stems, just as blood is transported around the human body.

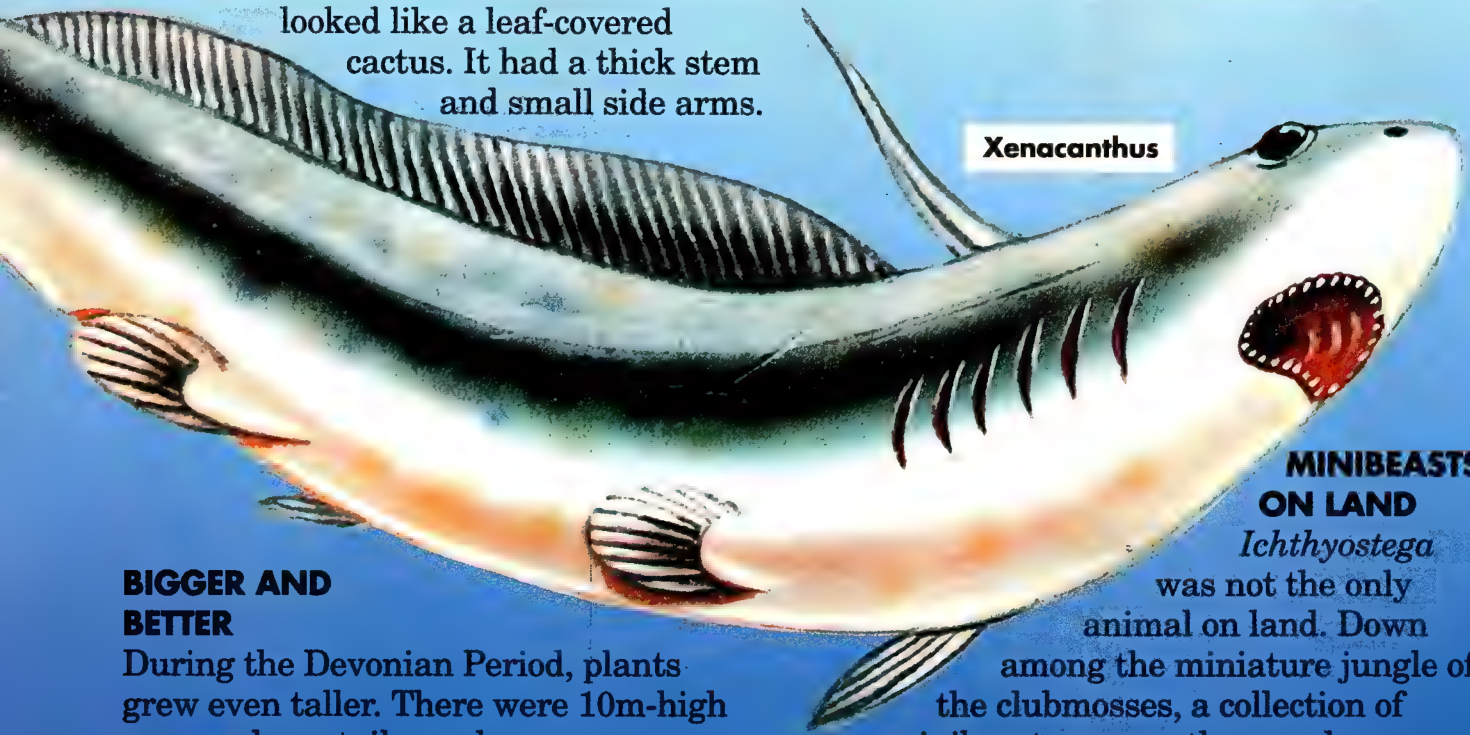
EARLY PLANTS

Rhynia was about 50cm tall. It had a central stem with small, twig-like side parts. The early land plants also included the clubmosses, such as *Asteroxylon,* which was about 1m tall and looked like a leaf-covered cactus. It had a thick stem and small side arms.

BIGGER AND BETTER

During the Devonian Period, plants grew even taller. There were 10m-high horsetails, such as *Archaeocalamites*, with its umbrella-like leaves. Another plant group, the ferns, made their first appearance. By the end of the Devonian Period, giant ferns, such as *Archaeopteris*, towered 20m above the land.

Gemuendina



Xenacanthus

MINIBEASTS ON LAND

Ichthyostega was not the only animal on land. Down among the miniature jungle of the clubmosses, a collection of minibeasts was on the prowl.

THE VERY FIRST INSECTS

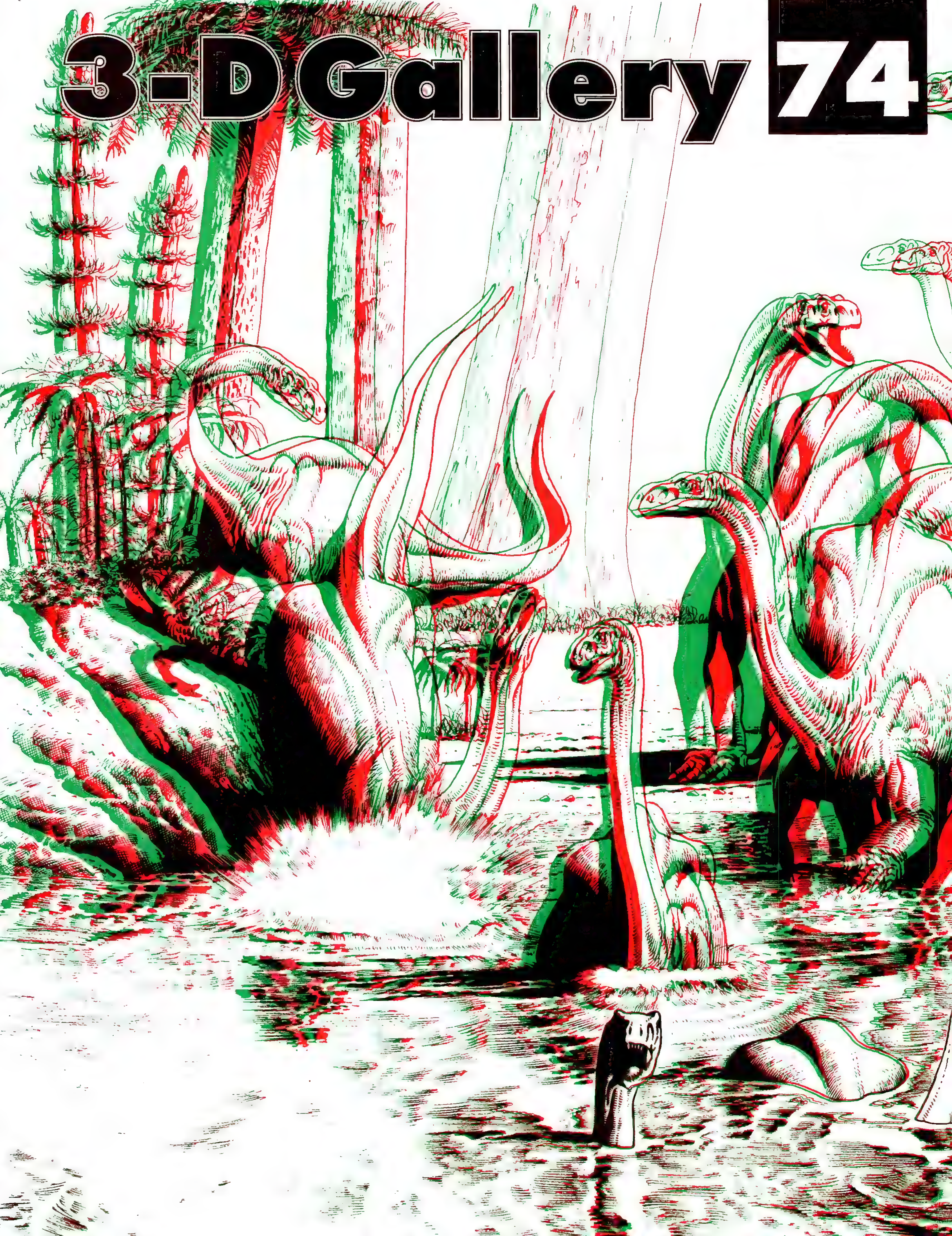
Crawling among the fronds were centipedes and millipedes, like *Archidesmus*, mites and the very first insects. *Rhyniella*, like many early insects, had no wings. *Anurida* was a Devonian springtail. Scorpions, like *Palaeophonus*, could sting their prey and rip it apart with their claws. By the end of the Devonian, there was truly life on land.

GIANTS OF THE PAST

A small pack of meat-eating *Jubbulpuria* excitedly gathers round a dinosaur's corpse. But there will be no free meal for them today - they have been spotted by gigantic *Indosuchus* and with a few quick strides of its powerful hind legs it is upon them. The terrified little dinosaurs scatter, but it is too late for one, as *Indosuchus* sinks its long, jagged teeth into its flesh.

INDOSUCHUS

3-D Gallery 74



LUFENGOSAURUS

200 million years ago in southern China, a group of ravenous *Lufengosaurus* gathers beside a river. These giant reptiles use their rough-edged teeth to strip leaves off branches and they have spotted a huge clump of leafy trees on the other side of the bank. But how can they reach them? Throwing caution to the wind, they plunge into the river and strike out for the other side as their hunger gets the better of them.

Dinosaur artist

Discover how a professional illustrator brings dinosaurs to life.

Dinosaur artists have to turn fossil skeletons into living creatures. We asked Mike Dorey to talk about his job.

HOW DID YOU BECOME AN ILLUSTRATOR?

"I always liked drawing – I used to do strip cartoons when I was 4! I studied at art college. Then I went to London to get a job as an illustrator. I drew strip cartoons for comics and did drawings for books, television and even pop videos."

WHY DID YOU START DRAWING DINOSAURS?

"I used to do strip cartoons for a famous comic called *Eagle*. One story was called 'The Land of the Dinosaurs'. I did lots of dramatic drawings of *Tyrannosaurus rex* and wanted to do more dinosaur illustrations."

HOW DO YOU DRAW A DINOSAUR?

"Before I start, I look at as many different drawings by other artists as I can. I also look very carefully at models and skeletons of dinosaurs."

HOW DO YOU BRING A DINOSAUR BACK TO LIFE?

"To make a dinosaur drawing really alive, I have to understand how the dinosaur might have moved. When I've worked that out, I can draw it in action."

'A Day in the Life of Brachiosaurus' being created by dinosaur artist Mike Dorey.

WHAT'S YOUR FAVOURITE DINOSAUR?

"I like *Styracosaurus* best. It looks so dramatic with all those horns!"

HOW DO YOU DO 'HISTORY IN PICTURES?'

"An author writes the words and I plan the pictures to go with them. Then I draw it all out in pencil. At that stage we show the rough artwork to our dinosaur expert David Norman to check. Then I go over it in black ink. I use blue or black for the shadows and shading and then paint in the colour and write the words in black."

WHAT ARE THE HARDEST BITS?

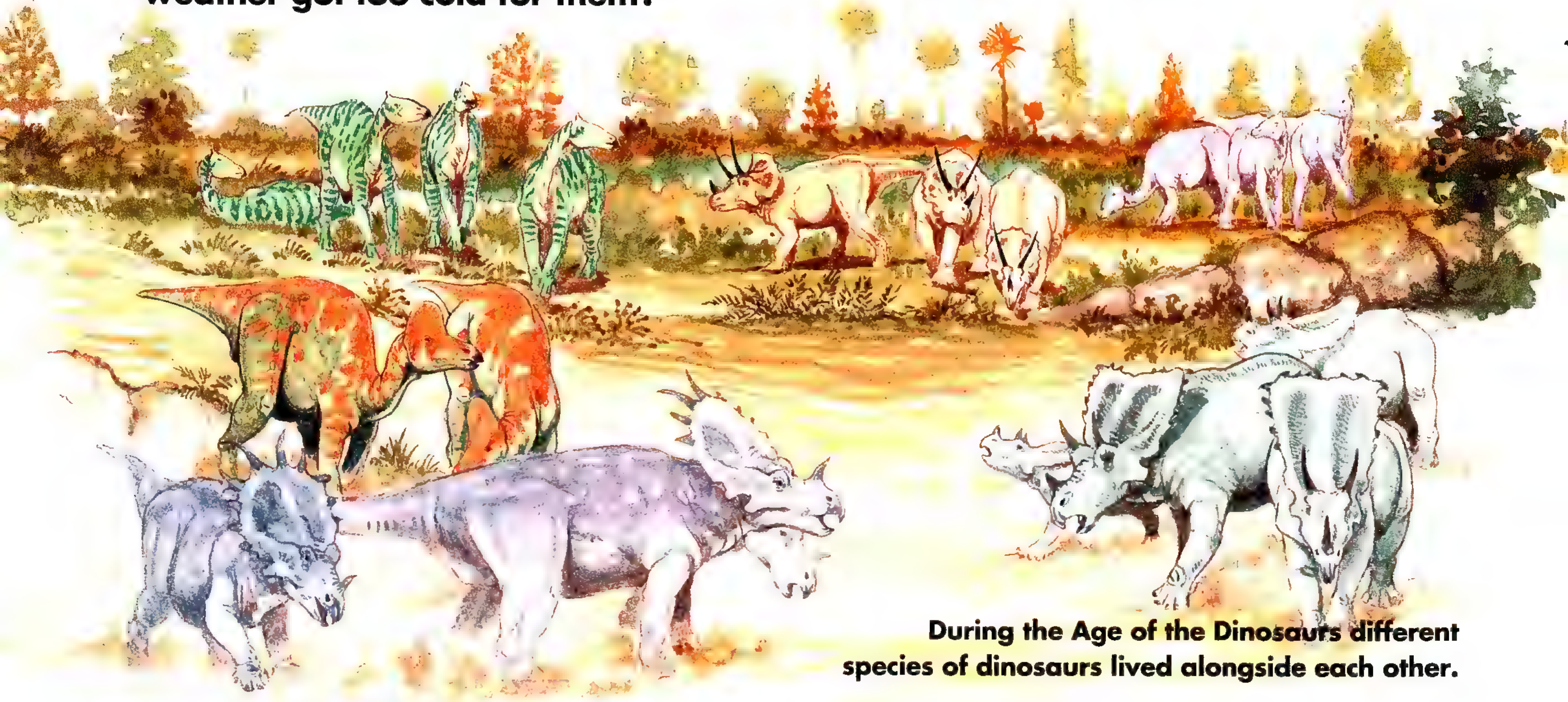
"The trickiest bit is to decide what colours the dinosaurs should be. No one really knows. Another difficult thing is to show how big they were, so I try and put a tree in for scale. Or I paint them as if I am looking up at them."

A chilling death?

Why the dinosaurs became extinct is one of the great unsolved mysteries of science. Was it because the weather got too cold for them?

DETECTIVE WORK

Theories are fine but they must be backed up with evidence. Time detectives look at rocks and fossils for clues.



During the Age of the Dinosaurs different species of dinosaurs lived alongside each other.

Why aren't there any dinosaurs today? Dinosaurs lived successfully for around 170 million years. Then, 66 million years ago, they all vanished.

FAST OR SLOW?

There are plenty of theories about why dinosaurs died out. Some of them are silly. Others are more sensible. There are two major 'sensible' theories. One is that the dinosaurs were killed off suddenly by a world disaster, such as a meteorite hitting the Earth or violent volcanic eruptions. The other theory is that they died out slowly over a period of time because the climate changed.

FOSSIL RECORD

So let's see what evidence there is for dinosaurs dying out because the climate changed. The fossil record shows that different species of dinosaur from the same family lived alongside each other.

What is? A FOSSIL RECORD

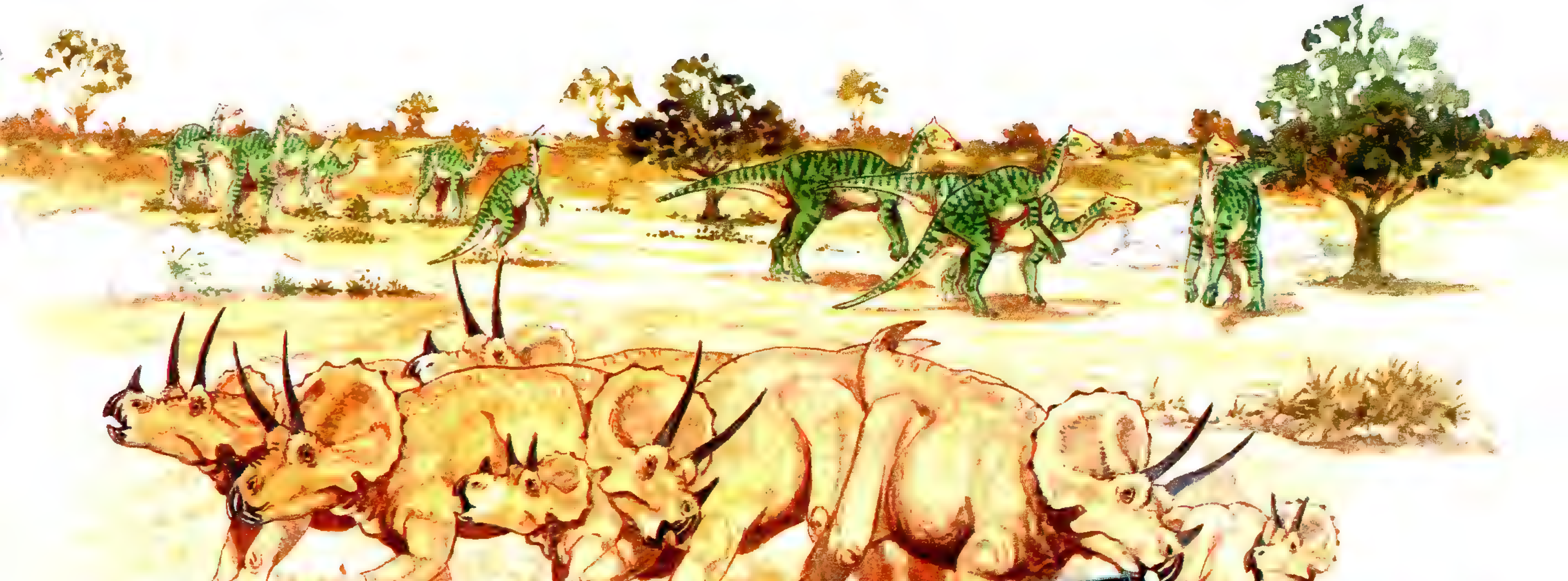
When someone writes down what happens it is called a record. A diary is a kind of record.Fossils in the rocks are the record of what happened to plants and animals millions of years ago. That's why palaeontologists call it the fossil record, or F.R. for short.

THE BEGINNING OF THE END?

In North America, for example, towards the end of the Cretaceous Period, several different kinds of duckbilled dinosaurs, such as *Prosaurolophus*, *Corythosaurus* and *Saurolophus*, lived side by side. But at the very end of the Cretaceous only Saurolophus was left. The same was true of the ceratopians.

PLENTY TO EAT

The kinds of plants in the Jurassic and Early Cretaceous fossil record show that the climate was warm with plenty of rain. These were ideal conditions for lush, green tropical forests to flourish. So dinosaurs who ate the plants did well. And dinosaurs who ate the dinosaurs who ate the plants did well too!



By the end of the Cretaceous, species had died out and were not replaced.

SLOW EXTINCTION

Triceratops, *Chasmosaurus* and *Styracosaurus* lived at the same time, but by the end of the Cretaceous only *Triceratops* was left. For scientists who support the slow extinction theory, the fossil record from North America is evidence that the dinosaurs died out gradually, species by species. But what was the cause?

PLANT CLUES

Dinosaur bones are not the only fossils found. Plants leave fossils too. Plants can tell us a lot about the Earth millions of years ago and about changes that may have caused the death of the dinosaurs.

Rainforest (above) and woodland.

COOLING DOWN

In the middle of the Cretaceous Period, the plants began to change. They became more like the woodlands of today's cooler climates. Scientists now believe that the Earth's climate changed and cooled drastically during the Late Cretaceous Period.

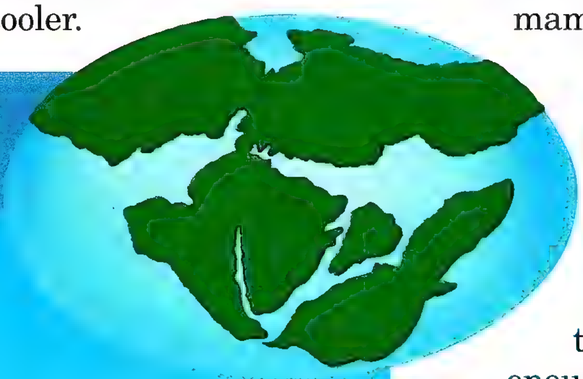
THE CHANGING SEASONS

Not only did the climate cool, it changed from cold to warm at different times of the year. The changing seasons had arrived. So why was there such a great change in the weather at that time? Some scientists think it was because the continents were on the move again.

THE DIVIDING LAND

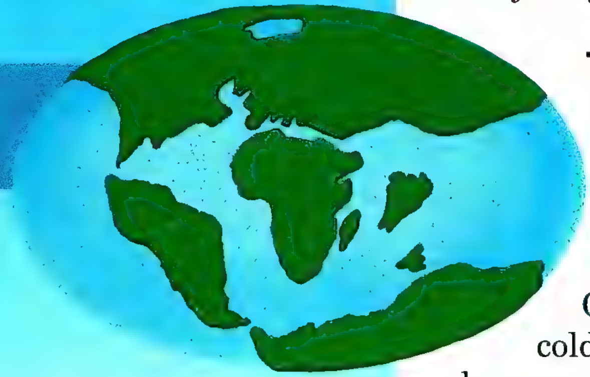
Australia was being pushed away from Antarctica. A great surge of cold water pushed up towards the equator, cooling the land. At the same time, the broad, shallow seas around the continents drained away exposing more land. The climate became drier and gradually much cooler.

145 MYA



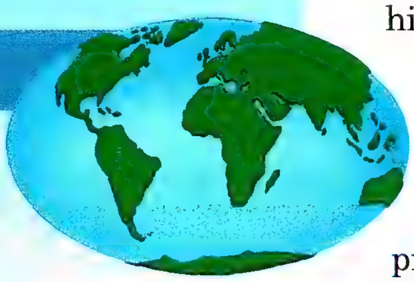
Late Jurassic. The land masses were drifting further apart.

66 MYA



Late Cretaceous. The oceans filled gaps between the continents.

Twentieth century



Today, there are great stretches of ocean.

Is it true that dinosaurs were not the only animals to become extinct in the Late Cretaceous?

Yes. There was a mass extinction in the Late Cretaceous. Among the animals that died out were the curly-shelled ammonites, the large marine reptiles such as mosasaurs and ichthyosaurs, and the flying reptiles such as the pterosaurs.

LOSING HEAT

Experts think that the dinosaurs could not adapt to the new conditions on Earth for several reasons. Large dinosaurs were probably endothermic or 'cold-blooded'. They could not create heat from food as mammals can. Once a large cold-blooded dinosaur lost heat from its body during cold weather, it was probably almost impossible for it to get warm again. Dinosaurs did not have feathers or fur to keep them warm when it got cold. Once they lost heat they did not have enough energy to look for food and they may simply have starved to death.

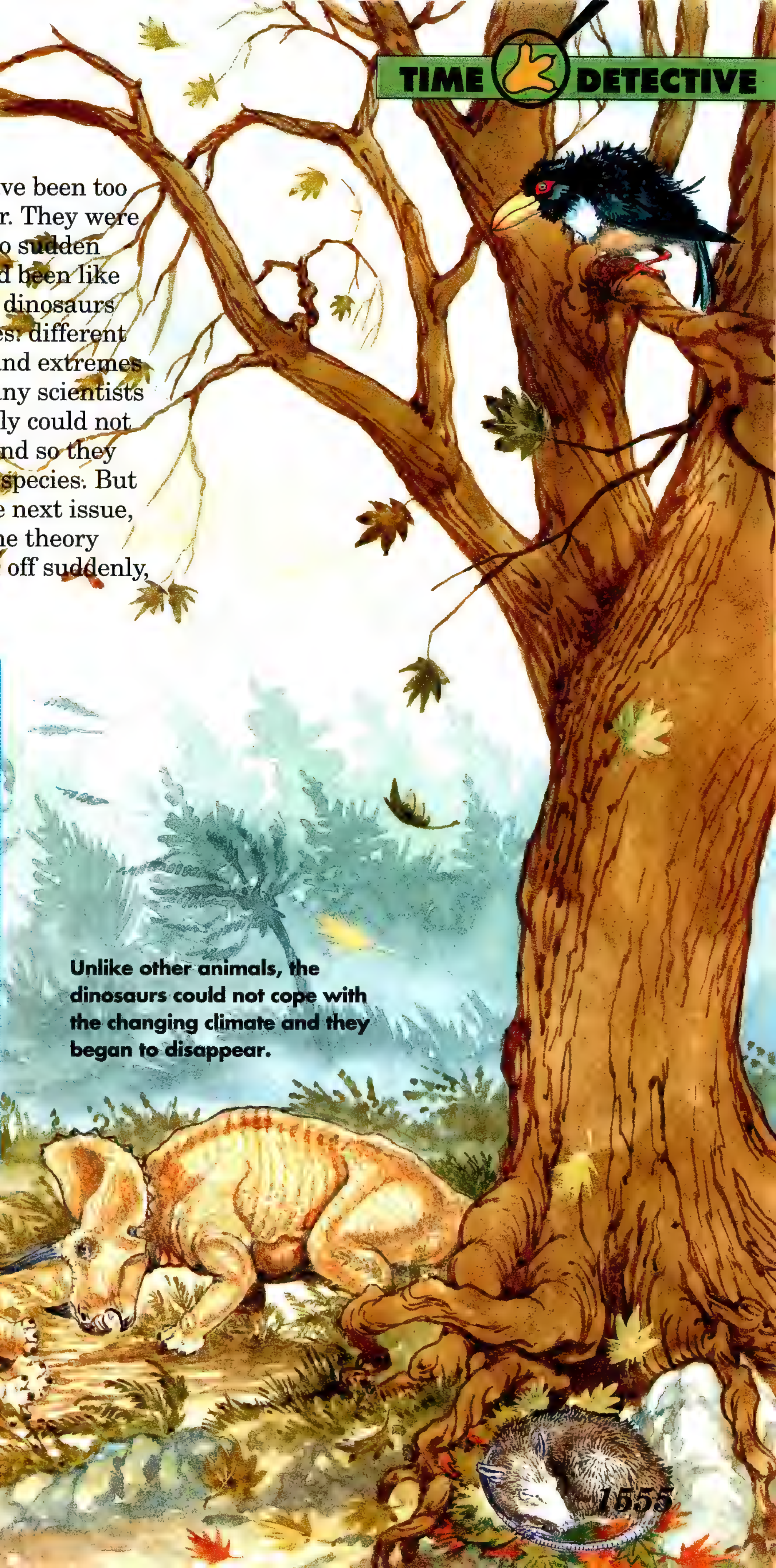
TOO COLD FOR DINOSAURS

Many other animals managed to survive the great cooling of the Earth. Some of them, such as mammals and birds, had fur or feathers to keep them warm. Others probably slept through the coldest times of the year. They dug burrows, or crawled into crevices and hibernated, just as today's dormouse does. But most dinosaurs were too big to dig burrows or crawl into holes. Dinosaurs had dominated the Earth for millions of years but they faced the colder weather with very little to protect them.

THE RIGHT THEORY?

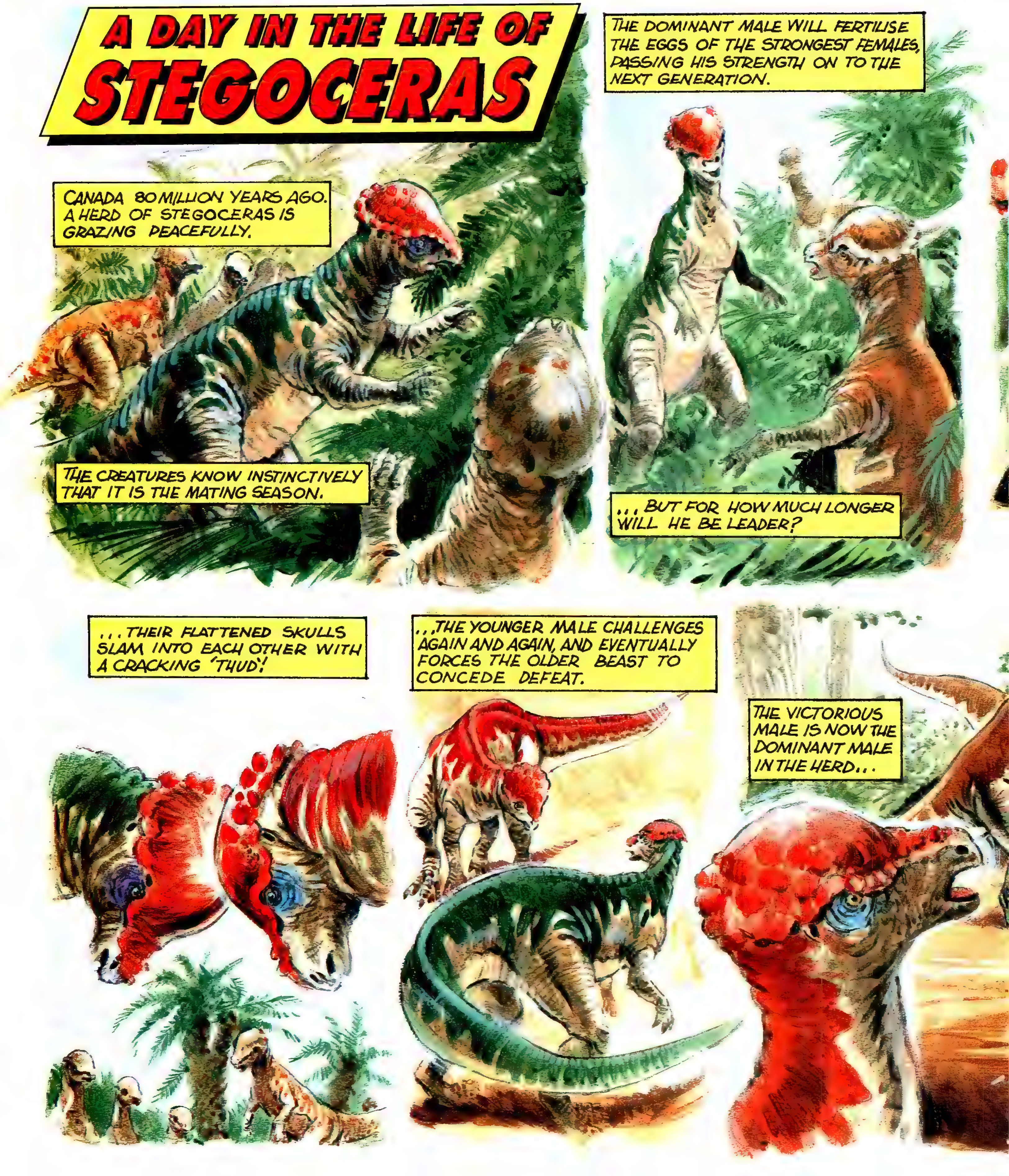
The long, slow cooling may have been too much for the dinosaurs to bear. They were used to warm weather, with no sudden changes of temperature. It had been like that for millions of years. The dinosaurs had to cope with many changes: different plants to eat, cooler weather and extremes of warm and cold weather. Many scientists think that the dinosaurs simply could not adapt to the new conditions, and so they gradually died out, species by species. But is that the right theory? In the next issue, you can see the evidence for the theory that the dinosaurs were killed off suddenly, in one great disaster.

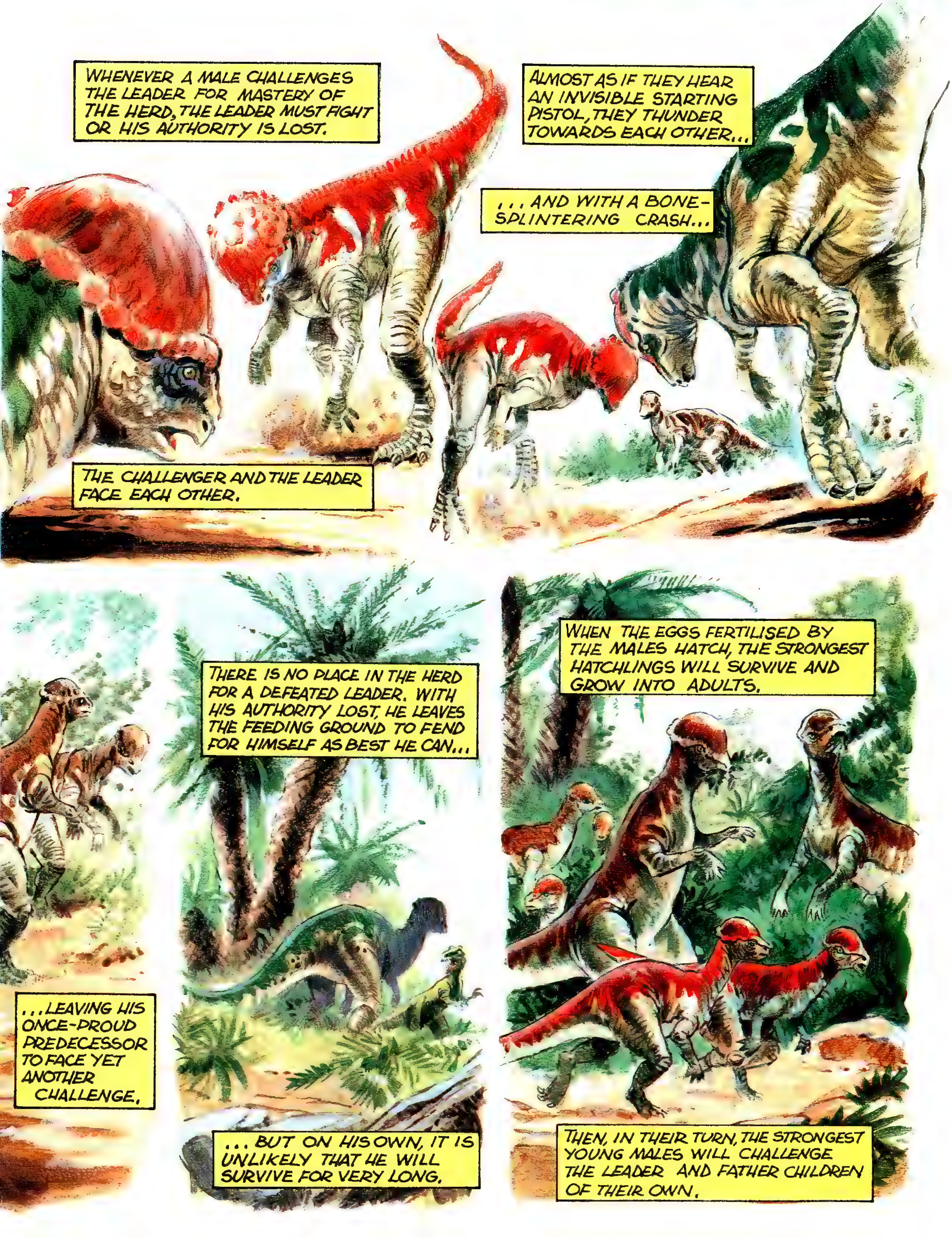
A dormouse can protect itself from the cold weather by hibernating in its nest.

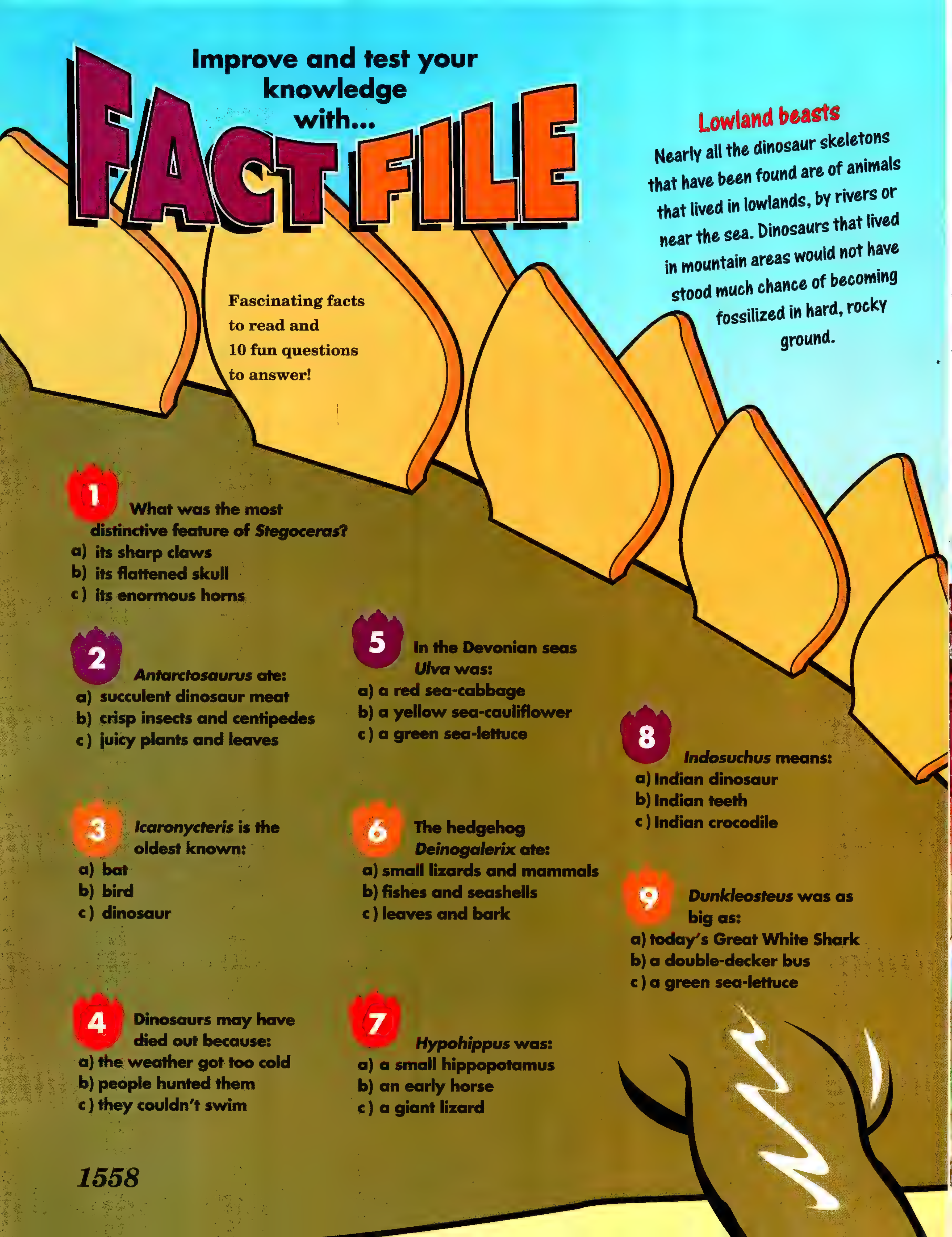


Unlike other animals, the dinosaurs could not cope with the changing climate and they began to disappear.

A DAY IN THE LIFE OF STEGOCERAS


CANADA 80 MILLION YEARS AGO. A HERD OF STEGOCERAS IS GRAZING PEACEFULLY.
THE CREATURES KNOW INSTINCTIVELY THAT IT IS THE MATING SEASON.
THE DOMINANT MALE WILL FERTILISE THE EGGS OF THE STRONGEST FEMALES, PASSING HIS STRENGTH ON TO THE NEXT GENERATION.
... BUT FOR HOW MUCH LONGER WILL HE BE LEADER?
... THEIR FLATTENED SKULLS SLAM INTO EACH OTHER WITH A CRACKING 'THUD'!
... THE YOUNGER MALE CHALLENGES AGAIN AND AGAIN, AND EVENTUALLY FORCES THE OLDER BEAST TO CONCEDE DEFEAT.
THE VICTORIOUS MALE IS NOW THE DOMINANT MALE IN THE HERD...


WHENEVER A MALE CHALLENGES THE LEADER FOR MASTERY OF THE HERD, THE LEADER MUST FIGHT OR HIS AUTHORITY IS LOST.
THE CHALLENGER AND THE LEADER FACE EACH OTHER.
ALMOST AS IF THEY HEAR AN INVISIBLE STARTING PISTOL, THEY THUNDER TOWARDS EACH OTHER...
... AND WITH A BONE-SPLINTERING CRASH...
...LEAVING HIS ONCE-PROUD PREDECESSOR TO FACE YET ANOTHER CHALLENGE.
THERE IS NO PLACE IN THE HERD FOR A DEFEATED LEADER. WITH HIS AUTHORITY LOST, HE LEAVES THE FEEDING GROUND TO FEND FOR HIMSELF AS BEST HE CAN...
... BUT ON HIS OWN, IT IS UNLIKELY THAT HE WILL SURVIVE FOR VERY LONG.
WHEN THE EGGS FERTILISED BY THE MALES HATCH, THE STRONGEST HATCHLINGS WILL SURVIVE AND GROW INTO ADULTS.
THEN, IN THEIR TURN, THE STRONGEST YOUNG MALES WILL CHALLENGE THE LEADER AND FATHER CHILDREN OF THEIR OWN.



Improve and test your knowledge with...

FACT FILE

Fascinating facts to read and 10 fun questions to answer!

Lowland beasts

Nearly all the dinosaur skeletons that have been found are of animals that lived in lowlands, by rivers or near the sea. Dinosaurs that lived in mountain areas would not have stood much chance of becoming fossilized in hard, rocky ground.

1 What was the most distinctive feature of *Stegoceras*?

a) its sharp claws
b) its flattened skull
c) its enormous horns

2 *Antarctosaurus* ate:

a) succulent dinosaur meat
b) crisp insects and centipedes
c) juicy plants and leaves

3 *Icaronycteris* is the oldest known:

a) bat
b) bird
c) dinosaur

4 Dinosaurs may have died out because:

a) the weather got too cold
b) people hunted them
c) they couldn't swim

5 In the Devonian seas *Ulva* was:

a) a red sea-cabbage
b) a yellow sea-cauliflower
c) a green sea-lettuce

6 The hedgehog *Deinogalerix* ate:

a) small lizards and mammals
b) fishes and seashells
c) leaves and bark

7 *Hypohippus* was:

a) a small hippopotamus
b) an early horse
c) a giant lizard

8 *Indosuchus* means:

a) Indian dinosaur
b) Indian teeth
c) Indian crocodile

9 *Dunkleosteus* was as big as:

a) today's Great White Shark
b) a double-decker bus
c) a green sea-lettuce

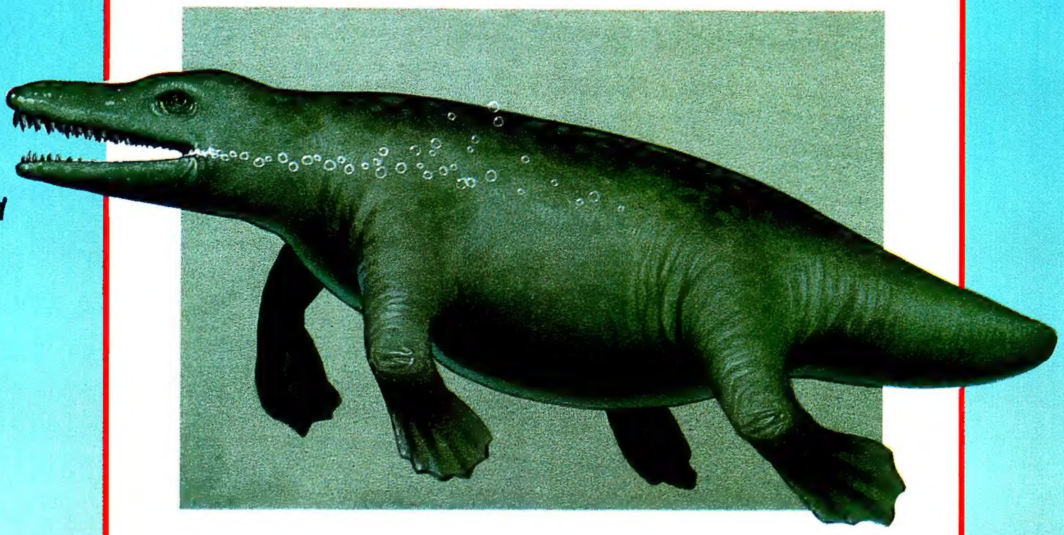
Serves them right!

In 1877 two railwaymen sent the famous dinosaur expert, Othniel Charles Marsh, some bones that they had found in Colorado, USA. This was the beginning of the great American dinosaur discoveries. Marsh sent a large sum of money in return, but the two men could not cash the cheque. They had used false names because they had found the bones while working in the railway's time!

Roman Dino

A dinosaur leg bone was studied in 1677 by the Reverend Robert Plot of Oxford, who deduced that it was the bone of an elephant brought to Britain by the Romans.

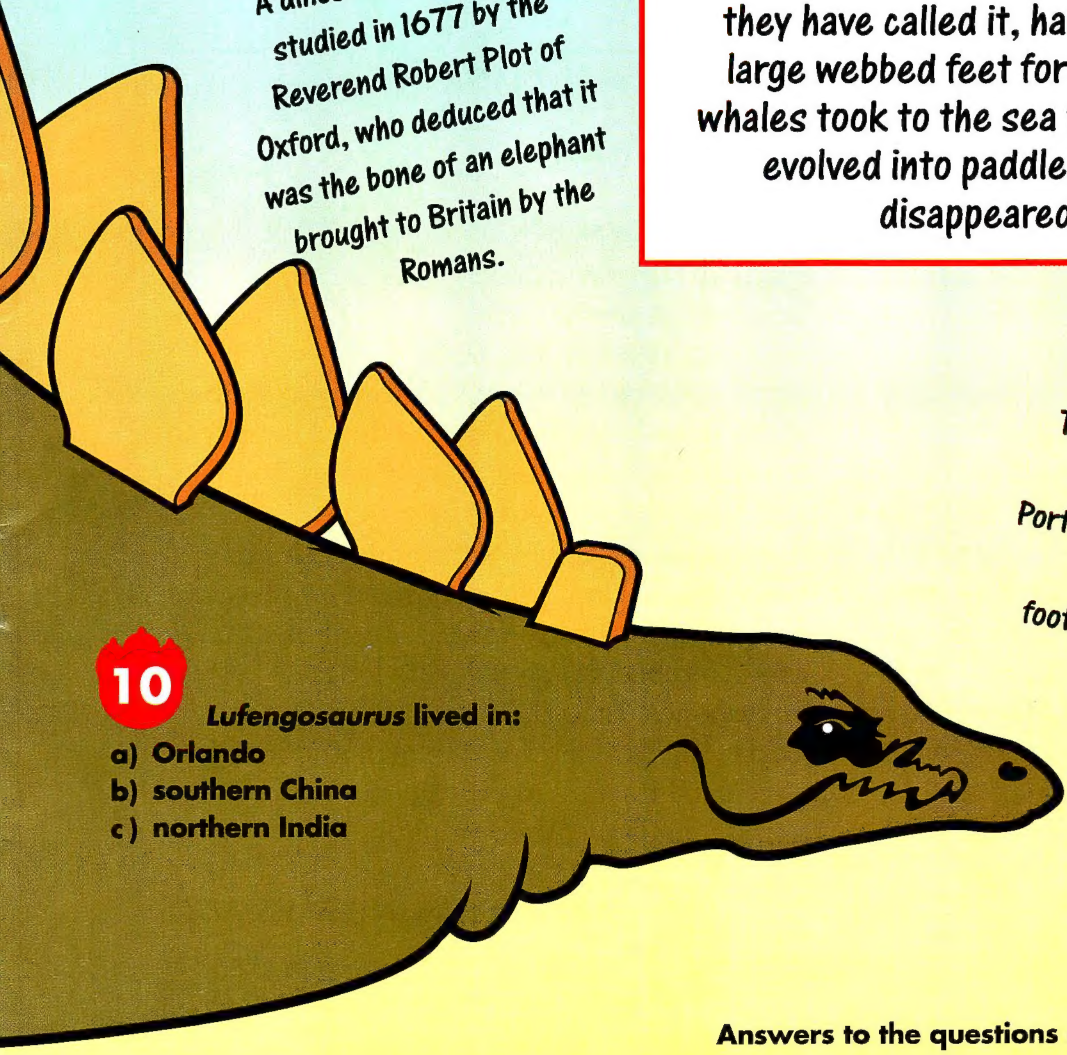
The whale that walked



Palaeontologists believe they have finally discovered the missing link between whales and land-dwelling mammals. They have found the 50-million-year-old fossil of a mammal that could both walk and swim. Ambulocetus, as they have called it, had short thick legs and large webbed feet for swimming. When the whales took to the sea full time, the front legs evolved into paddles and the back legs disappeared altogether.

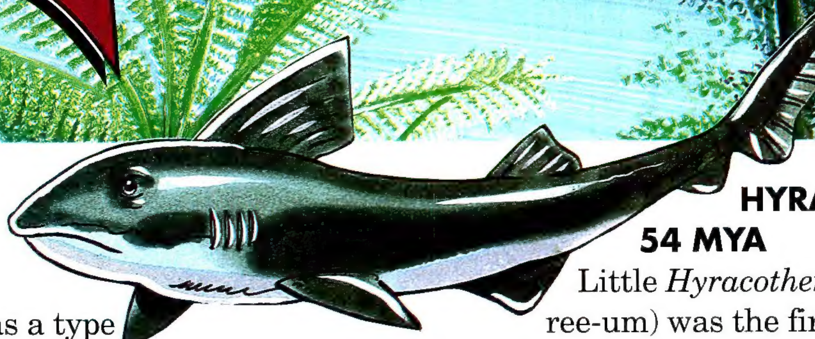
Dino route

The longest dinosaur trackway ever discovered lies outside Lisbon in Portugal. It is 120m long and is made up of Cretaceous iguanodont footprints. A new road has had to be rerouted to avoid them.



10 *Lufengosaurus* lived in:
- a) Orlando
- b) southern China
- c) northern India

Answers to the questions on inside back cover



HYBODUS

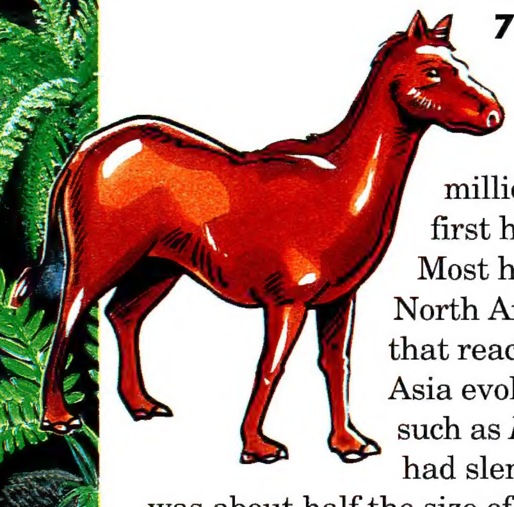
250 MYA

Hybodus (hy-bo-dus) was a type of early shark which lived all over the world for about 150 million years, from the Late Permian to the Early Cretaceous Periods. Its long, narrow body was almost as long as a small car, with a skeleton made from gristle (cartilage) and jaws filled with ferocious teeth.

HYLONOMUS

310 MYA

Hylonomus (hi-lo-nome-us) was a lizard-like reptile. Its skeleton was found in a tree stump in Nova Scotia, Canada. One of the oldest-known reptiles, it lived in the middle of the Carboniferous Period. *Hylonomus* was about 20cm long and preyed on insects. Its name means 'wood law'.



HYPOHIPPUS

7 MYA

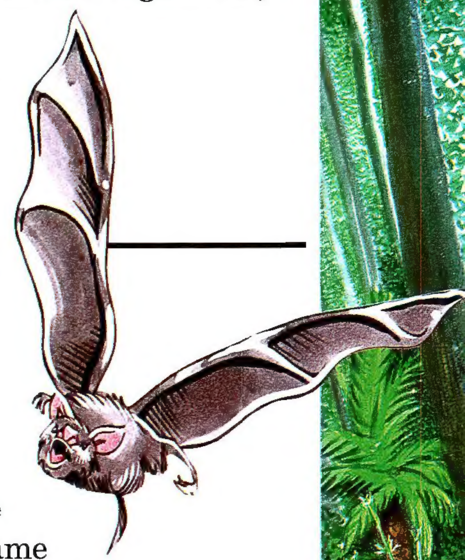
Hypohippus (hi-poh-hip-us) lived more than 40 million years after the first horses appeared. Most horses evolved in North America, but those that reached Europe and Asia evolved into creatures such as *Hypohippus*, which had slender limbs and was about half the size of a modern horse.

HYRACOTHERIUM

54 MYA

Little *Hyracotherium* (hy-rak-oh-thee-ree-um) was the first-known horse. The first fossil was discovered in 1839 near London, England. It was tiny compared with the horse of today. It lived in the thick sub-tropical forests of England, the USA and Asia in Eocene times and fed on soft vegetation, such as leaves. It had a curved back, short neck and slim limbs. *Hyracotherium* means 'shrew beast'.

I



ICARONYCTERIS

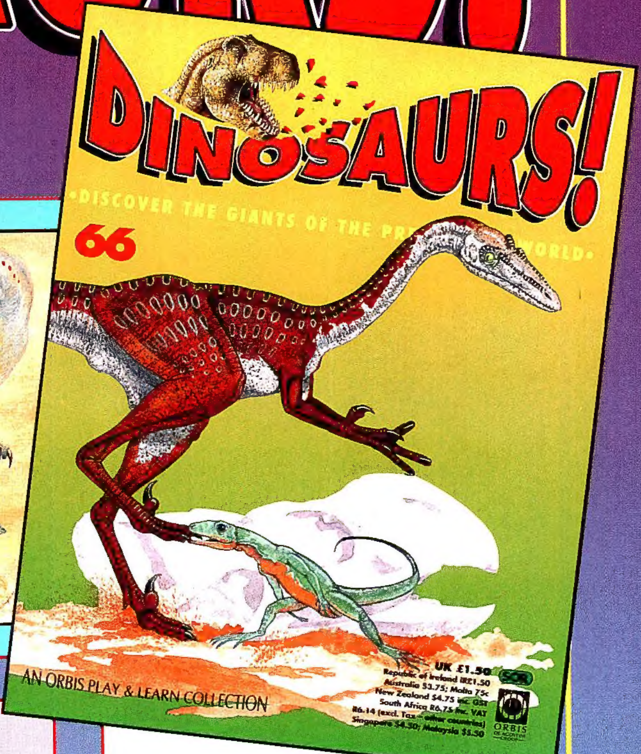
40 MYA

About as long as a large rat, *Icaronycteris* (ik-ar-on-ik-ter-is) is the oldest-known bat. Its name means 'Icarus of the night' after Icarus, the youth in a Greek legend who flew too near to the sun which caused his wax wings to melt and him to plummet to the ground. *Icaronycteris* lived in Wyoming, USA, in Eocene times and probably lived on insects. Its large wings were made from skin which was stretched out to cover its long fingerbones. Like the bats of today, *Icaronycteris* slept upside-down and may have used its ears to pick up the high-pitched sounds made by other animals.

MYA = MILLION YEARS AGO

COMING IN PART 66 OF

DINOSAURS!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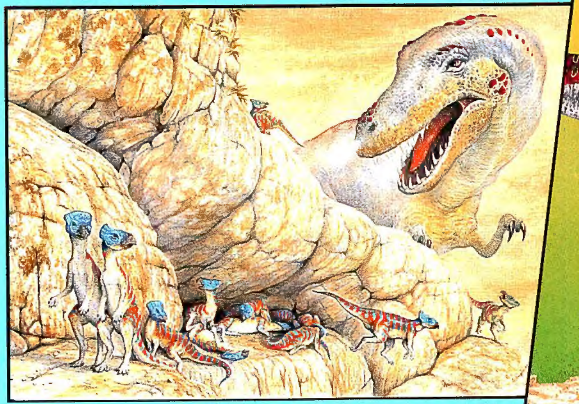
Did a meteorite wipe out the dinosaurs? Find out in TIME DETECTIVE. Horses 50 million years ago feature in PREHISTORIC WORLD.



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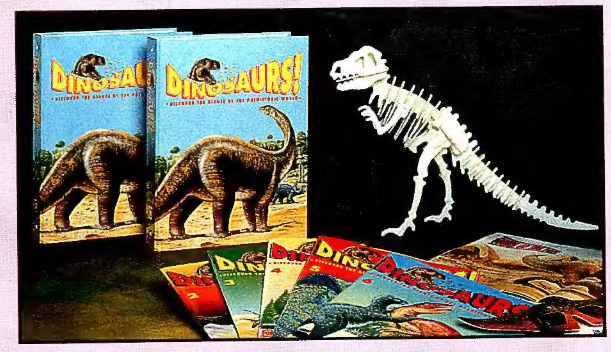

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PLUS

Three fascinating creatures in IDENTIKIT and
HISTORY IN PICTURES
3-D GALLERY
GIANTS OF THE PAST

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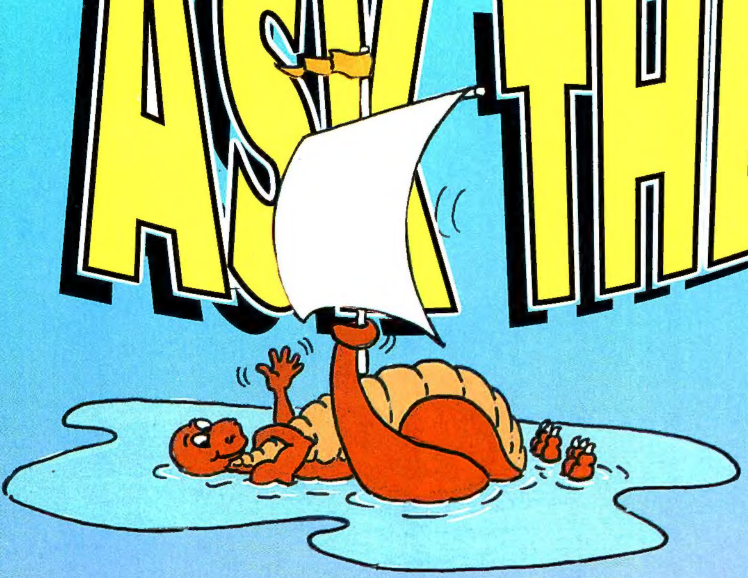
ANSWERS TO FACT FILE QUESTIONS: 1.b 2.c 3.a 4.a 5.c 6.a 7.b 8.c 9.a 10.b

Dr David Norman of Cambridge University answers your dinosaur questions

ASK THE EXPERT



If a big dinosaur fell into a river, would it float or sink?

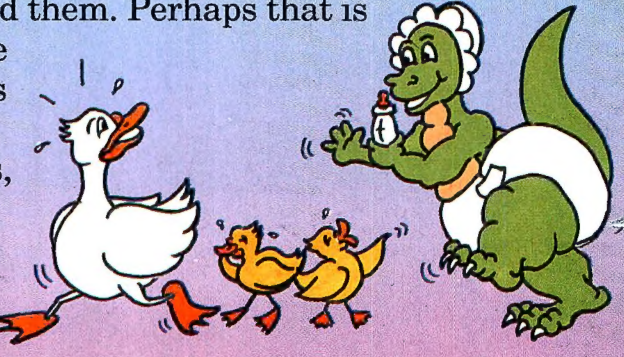
Big dinosaurs were surprisingly light. They may even have had air-filled pockets along their backbones to reduce their weight. If this was the case, then huge dinosaurs would have floated incredibly well if they fell into water.

If dinosaurs were covered with feathers, why haven't we found fossils of the feathers?

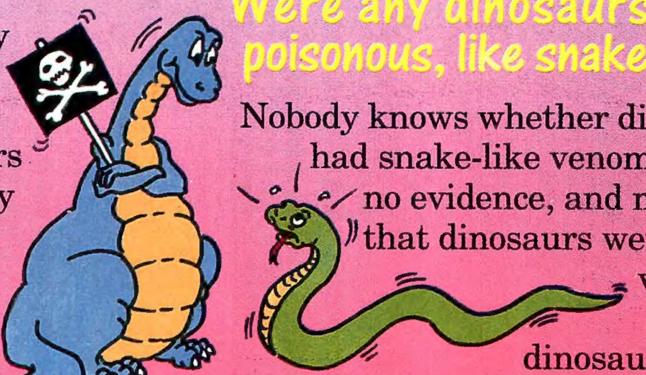
Some scientists think dinosaurs may have been covered with feathers but it is very rare to find fossils of soft tissue, such as feathers. Feathers are made of keratin, which rots away quickly after death. Most dinosaurs died on land and were then washed into rivers and lakes. This meant that feathers rotted away before they could be preserved. However, *Archaeopteryx* feathers have been preserved in fine, sticky mud. As you can see, it is very difficult to find evidence for or against the feather theory, but I still do not believe that dinosaurs had feathers!

Would adult dinosaurs have recognised their own babies?

It is likely that the dinosaurs, such as hadrosaurs, which built nests and fed their babies, did recognise their young. However, it is just as likely that many dinosaurs laid their eggs and left, paying their young no more attention.They never recognised them. Perhaps that is why some dinosaurs were cannibals, eating their own kind.



Were any dinosaurs poisonous, like snakes are?



Nobody knows whether dinosaurs had snake-like venom. There is no evidence, and my guess is that dinosaurs were not venomous. But dinosaur spit may have been dangerous. Like that of animals today, it probably contained unpleasant chemicals.